THE ZOOLOGIST

No. 883.—January 15th, 1915.

SOME FISH-NOTES FROM GREAT YARMOUTH AND NEIGHBOURHOOD FOR 1914.

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Just after my "Notes" for 1913 were sent to the 'Zoologist' I received a communication from Mr. E. R. Cooper, of Southwold, dated December 13th, in which he stated:—"This has been a record week in the history of spratting; during the seven days, including to-day, there have been landed in the harbour 2400 bushels, and probably during the same period 5000 bushels have been landed on the beach.* The price has also kept up well, from 3*s*. 6*d*. to 2*s*. 6*d*. per bushel; and considerable quantities are being pickled for export.† . . . The fish have been quite close to the shore, and it has been a sight to see the thousands of Gulls taking the Sprats as they come to the surface along the line of nets. The last two seasons there have been landed at harbour: 1911, 680 bushels; 1912, 1326 bushels."

I am afraid the time-honoured (?) practice of selling Sprats for manure still obtains; a great pity to practically waste so much nutritious food when other manures, both artificial and natural, are obtainable. I see no reason why British manufacturers should not utilize on a more considerable scale these

* Mr. Cooper, in a footnote, adds, "The fish landed on the beach are not tabulated."

† I believe German fish-buyers purchased great quantities for "tinning down."

fishes as Sardines as a substitute for juvenile Pilchards, just as immature Herrings have entered largely into the table dainty known as "Skipper Sardines," a most tempting and appetising form of food. Unfortunately, owing to elemental caprices of the Sprat season, the catches are not always to be relied upon.

On January 3rd (1914) we had a lot of Sprats sent to Yarmouth which had been "stow-netted"—a lack-lustre, scaleless, washed-out display of murdered fishes, contrasting strongly with the tempting "droves" taken in October and November in the drift-nets. As late as the 22nd these stow or "set" Sprats were still in evidence.

I met a fish-hawker with a barrow-load of small Herrings, little larger than Sprats, which did not look worth the trouble of cooking in any form. The man himself, who seemed half ashamed of his limp scaleless fishes, assured me that they were part of a catch sent semi-privately from Scotland to a larger buyer. They were trawled stuff, and a sad reflection on the greed that prompted the use of this net, especially upon such immature and useless fishes.

The local shrimpers got their boats and gear together exceptionally early this year, some of them putting out in the latter part of January. Their initial catches of "Pink Shrimps" (*Pandalus montagui*) were very small, and the crustaceans themselves not full-grown, although a considerable majority of them were berried. These men did very badly during the spring and summer months owing to the water being so "sheer" (clear), when the Shrimps and Prawns so easily see the approaching net and evade it. Moreover, immense hordes of small Whitings played havoc with these crustaceans. The Whitings were in evidence all along the East Coast, from the Humber to Aldeburgh. Dr. H. Laver, of Colchester, complained to me of the almost utter failure of the shrimping industry off the coast of Essex. He wrote (dated October 25th, 1914):—"I cannot think your explanation [the Whiting pest] as to the scarcity of Shrimps covers all. Last season in the Brightlingsea district, where there are large numbers of smacks engaged in this industry, we started well and, strangely, those caught in the beginning of the season were large mature ones, contrary to the usual catches, when we have small first. . . . We have had this season a scarcity

unequalled in the memory of the oldest men. . . . Now comes a strange feature: Have you ever known two seasons in succession where so few females are carrying eggs? . . . I have no doubt the enormous number of small Whitings, and, worse still, Whiting Pouts [Bibs], have had a great effect. With regard to Whiting Pout (*Gadus luscus*), they have abounded to an extent never before known here. They have come up the Colne into shallow brackish water, and I think they have been the greatest cannibals as regards Shrimps."

Inspector Donnison in his 'Report' characterized the catch of Brown Shrimps (*Crangon vulgaris*) as a failure: "At Harwich the season was the worst on record." The Inspector says: "At Lowestoft and Yarmouth the men were at sea day after day, and got practically nothing." The same applied to the Wash fishery. His opinion was that the enormous numbers of Whitings, and to a less extent small Codlings, which for months "infested" the inshore grounds, were mainly responsible.

When chatting with some shrimper friends on this subject, they anathematized the hordes of young Whitings (that ran from three to four inches early in the season) "which ate up all the young Shrimps." One man in April, dredging from the Jetty to the Britannia Pier, off Yarmouth (less than half a mile), filled no less than two "maunds" (bushel-sized baskets) with these annoying, because useless, fish. When off Winterton early in June, he dropped his net and towed it for fifty yards; on hauling it in he found a mere handful of Common Shrimps, and *two pecks* of Whitings, five inches in length!

The men have altogether been hard hit, for when conditions were becoming somewhat more favourable and visitors (their best customers) were beginning to troop into the town, the devil of pride and avarice entered into the Kaiser, and war broke out, an immediate stampede depleted the lodging-houses, and the "season" came to an abrupt end.

On January 23rd I was discussing some Periwinkles, when I discovered one with a white pearly line following the whorls of the shell round and round.

By the merest accident I observed, on January 26th, on a fish-slab upon a heap of others, what I, at the moment, thought was a Flounder. A second glance assured me that the fish, its

under side uppermost, was slightly different in shape. On reversing it I found the thick or dorsal half was very much in appearance and texture like the Flounder; the "lower" half was freckled and decorated with the small knob-like processes seen on the Turbot. The ventral spine of the Flounder parent was present, but proportionately thicker and shorter. It contained roe. Length 17 inches; width 9½ inches; weight 2½ lb. I purchased the fish, and had it fried for my dinner, finding the flesh firm, and more like the Plaice in flavour. The big "breeches" (sexual organs) I could not decide to be either roe or milt, until having fried them, the globules of ova came out distinctly enough under a lens.

January 28th.—Saw an example of the Lemon Sole (*Solea lascaris*) "paired" with a Common Sole, on sale on a fish-slab.

Plaice Notes.—On January 30th I saw several Plaice, all of the same size, and it is more than probable they were of the same brood, with patches of the olive green upon the under surface. These were decorated by red spots corresponding with those in size and position on the upper surface. I have before noticed that when a Plaice has been taken exhibiting blotches below, there are almost invariably others turning up of a similar peculiarity and of exactly the self-same size. A left-handed Plaice was shown me by a fishmonger, who was at the moment cleaning a number of the species. He noticed it immediately he started to behead it for filleting. He had to turn the fish about.

February 2nd.—A fine Ballan Wrass, the colour of a Tench, was placed in my hands. There was some considerable excitement created at Corton in April over the advent of another Ballan Wrass, eight inches long. The village correspondent sent a glowing account of it to the local paper, in which he describes its "gorgeous colouring, green, gold, and blue running riot over an olive green ground. It was exhibited to all and sundry, but even fishermen of experience could not name it, never having met its like before." It was finally booked as a Gilthead, but my young friend, Mr. F. C. Cook, biked over from Lowestoft, and was fortunate in seeing it before it was destroyed. He immediately identified it as *Labrus maculatus*. I have not

the slightest doubt that this species turns up as frequently off the Suffolk coast as it does off Norfolk.

I never remember seeing such quantities of small, undersized sea fishes—"refuse" from the trawl-nets—hawked round the town on barrows as obtained early in February: hundredweights of small Plaice, the size of one's hand, and Skate no larger than tea-saucers. Such a waste of fish I suppose must necessarily follow the use of the trawl-net, but it is pitiful, nevertheless.

February 6th.—I notice that the Whitings which at Christmas time measured but 4½ inches, and were taken very numerously on the lines of sea-anglers, now measure 6 inches. In October they had grown to 10 inches and over. Local waters teemed with this species in February, and Cods captured had their stomachs packed with Whitings.

A Codling of 2½ lb. weight was landed by a Gorleston sea-angler, which was entirely minus a right pectoral fin, there being neither stump nor "swivel" present.

Pike were much in evidence at Oulton Broad, near Lowestoft, in January and February, a writer describing the water as "being alive" with them. Anglers made excellent catches.

The John Dory, early in the year, was numerously caught by Lowestoft trawlers off the North Norfolk coast. The average ran to about the size of tea-plates. I think them excellent eating: one needs but gut them and lay them in water in a frying-pan. When cooked it is an easy matter to scrape off the skin with a prong, and by a dexterous whip round the fins may be cleanly drawn out. With a little care the sides while firm and boneless may be removed from the backbone. A little piquant sauce immensely adds to the delicacy of the flesh.

It is rather remarkable that for all my many years' attempts to secure a local example of the Burbot (*Lota vulgaris*), I have been unable to do so. On February 10th Mr. W. H. Tuck, of Bury St. Edmunds, wrote me that in answer to a letter Mr. Howlett, of Newmarket, the well-known taxidermist, assured him that he could procure a specimen at any time. Thus wrote Mr. Howlett:—"I have frequently had these peculiar fish brought me. They are common in many of the dykes and tributaries of the Lark River. Only a fortnight since a 'dyker' brought me

two, not very large, about 2 lb. each. Horrible-looking fish, but the Fen natives tell me they are of a fine pink-coloured flesh, like a Salmon, and very good eating." The species seems fairly well distributed, and is mentioned in most local faunas, but it seems so elusive that it is referred to often with rather vague description. Lubbock ('Fauna of Norfolk') says: "I have known many caught; and some two and three pounds in weight." The last Norfolk example of which I have any record was taken in the 'seventies. Mr. J. R. B. Masefield, "North Staffordshire Freshwater Fish" (N. S. Field Club's 'Transactions'), remarks that "Col. Masefield has this fish in his ponds, where he says they do well, and he once caught one with a Minnow, 4 lb. in weight."

Dr. Day ('British Fishes') refers to a general belief that the species is dying out and "doomed to extinction"; this would seem to me to fairly well apply to it in Norfolk rivers. I hope I am wrong.

February 27th. — Thousands of sprat-sized Whitings are being captured in the shrimp-nets. They are a nuisance both to the shrimper and to the sea-angler, one of whom hooked about two hundred in two days.

Pike on the Norfolk Broads had been fairly well on the feed at the end of February and beginning of March. Among other catches of this "freshwater Shark" may be mentioned one by a London angler, who secured three fishes in one day, weighing respectively 21 lb., 14 lb., and 9 lb. In two Pike captured were found Bream; one fish having in its stomach two Bream, each weighing 1½ lb. At this particular time they seem to have been freely taken on the Beccles River (Waveney), and at Oulton Broad, near Lowestoft. One at Wroxham was captured which weighed 22 lb., length 3 ft. 5½ in., girth 1 ft. 11½ in.

A largish Lumpsucker (*Cyclopterus lumpus*) was taken in a shrimp-net early in March. The fish was dropped into a puddle of salt-water at Gorleston, where it created some degree of interest among onlookers. Although fairly common, especially in the spring, its pumpkin-shaped body and rough skin always excite the curiosity of a crowd and the fisher-folk themselves.

Small Whitings swarming on Breydon. On March 11th a shrimper, dredging up the channel there, secured half a bushel.

He had also captured several small Bass of some half-pound weight each.

May 4th.—A 3-inch Black Sea-Bream (*Cantharus lineatus*) was brought me by a shrimper. A few faint dusky lines were visible on either side. This species is rare in this locality. None of the Sea-Breams are in any repute for food in this neighbourhood, and none are ever sent here with the trawl fish.

Mr. Thos. C. Rising, of Lowestoft, wrote me on April 21st to the effect that some fishermen draw-netting at Corton (half-way between Yarmouth and Lowestoft) captured some dozen Bass running up to 10 lb. in weight. "In view of the comparatively large numbers of small Bass taken here by anglers during the past season, one might almost wonder if this sportive fish is likely to take up a residence in our neighbourhood."

May 12th.—A very nice example of the Boar-Fish (*Capros aper*) was sent me which had been captured in the neighbourhood of the Wash.

Found an exceedingly large female Three-spined Stickleback (*Gasterosteus aculeatus* var. *semi-armatus*) lying dead in a ditch near my houseboat. The water is always more or less salty, as the tidal water filters through the sluice, and the dense vegetation must make swimming a matter of some difficulty. To account for this fish's death, I can but make conjecture that it could not find a mate and nest and the excitement necessary to a complete and due disposal of its ova. I have occasionally found other females dead packed with mature eggs.

On May 10th when "opening" a bloater for grilling I noticed the Herring's stomach somewhat unduly distended: on emptying it into a tube of spirits, and shaking it gently, the contents dissolved themselves into a number of small crustaceans—*Hyperia*, probably *Lestrigonus exulans* (Kröyer), the dark heads seeming all eyes. A few minute *Gammarus*, somewhat digested, were also to be distinguished.

May 27th.—Scribbled Mackerel (*Scomber scriptus*), a 12-inch example, came to hand to-day. Fish of this *variety* (?), several of which I have seen, never exceed and seldom attain a length of 15 inches. It contained a fairly well-developed

roe: the stomach was empty. When cooked I found the fish dry and insipid. In the stomach of a Common Mackerel I found, on the 28th, about a dozen Lesser Sandlaunces.

In the 'Fishing News' of June 13th an interesting account is given of a Mackerel glut, when vast shoals filled Dovercourt Bay in the extreme south of Suffolk. It is reported that boatmen by just dipping their nets overboard caught large quantities. Many of the inhabitants had quite an exciting experience in dragging ashore nets packed with fishes; even young urchins fishing with rod and line secured numbers, some getting over a score. Persons who waded into the water landed numerous fish. It was supposed at the time, and no doubt correctly, that Whitebait swarming in the shallow inshore waters were the attraction, and that Porpoises unwittingly "played a part." Undoubtedly these cetaceans were having a really good time among the Mackerel.

During the month of June the Suffolk ditch connected with the Waveney, in which my houseboat is moored, was swarming on the neap tides with Roach, running to half-pounders. They came to a shallow corner near a sluice-gate to bask in the sun and to feed on the flannel weed (*Conferva rivularis*). I could persuade but a very few even to look at my fat gentles: one or two which I dissected had their stomachs distended with the weed, and their intestines were loaded outside with an accumulation of fat. They, when horizontally poised, appeared keenly alive to what happened in front of or above them, and would dash with extreme celerity at any insect floating upon the surface. They moved about like so many sheep, and often fed in a shoal head downwards; the upper lobe of the tail, waving easily, kept them in position. The drainage water from the farm and slightly higher part of the marsh was dirty, and probably abounding in *Infusoria*. Many were exuding digested weed. One I captured had a host of black spots under the scales, a common occurrence, due to the presence of parasitic *Sporozoa*: fish feeding in unclean waters seem very susceptible to it.

Some large prices were realized at Lowestoft in August, shortly after the outbreak of the war. On one occasion a Ramsgate smack landed a catch at the fish market. "Roker"

(Thornback Ray) fetched £2 a trunk; small "Roker" made 30*s*. The weight per trunk would be roughly about eight or nine stone. A previous "record" was in August, 1909, when I saw a picked trunk of this fish sell at 30*s*. This happened after a long spell of calm weather, when the sailing-boats could not fish. A trunk of Soles on that occasion went as high as £13: on the present "Slips" (small Soles) made £12 a trunk; and I should think that the sum of 15*s*. for 14 lb. of Plaice had never before been exceeded.

Angling on the Broads this summer was not up to the average, although occasionally fish came on to feed and afforded some sport. At Hickling Bream (*Abramis brama*) bit well in the middle of August; one angler taking 6½ stone in a few hours. A gentleman fishing in that neighbourhood for a week had a good time with the Perch, catching fish weighing respectively 2¾ lb., 2 lb. 1 oz., 1 lb. 10 oz., 1 lb. 8 oz., and 1 lb. 4 oz. It is a great pity that local prejudice condemns all the hundredweights taken yearly to the refuse-heap.

Several Scads, or Horse Mackerel (*Caranx trachurus*), were captured by sea-anglers both at Yarmouth and Lowestoft during the month of August. Plenty are netted among the Herring and Mackerel, but they seldom come to feed in shallow waters, and as a rule are rarely hooked.

A rather unusual show of Sapphirine Gurnards (*Trigla hirundo*) at the latter part of August. They had been taken in waters comparatively close by, as fishing trawlers have been frequenting restricted areas, owing to the unholy sowing of mines in the North Sea by the Germans. The Sapphirine Gurnard is mostly on sale in May, when fine examples are seen on the fish-slabs.

Whitings.—Sea-anglers commenced fishing for Whitings early in September, when these fish, which proved exceedingly abundant, ran to 10 inches and 12 inches in length. The piers were well crowded with eager fisher-folk, and many fished from the beach, where at night the seashore was lined with lanterns, which marked each piscator's location. I collected a few current figures from the "number board" attached to one—the Britannia Pier—covering the best part of three separate weeks: the numbers are as follow:—

Sept.	19th	...	76	Whitings	10 Dabs	12	Codlings
,,	20th	...	175	,,	9 ,,	56	,,
,,	21st	...	313	,,	9 ,,	94	,,
,,	22nd	...	299	,,	12 ,,	31	,,
,,	23rd	...	218	,,	14 ,,	28	,,
,,	24th	...	334	,,	17 ,,	5	,,
,,	25th	...	417	,,	35 ,,	4	,,
,,	26th	...	603	,,	24 ,,	2	,,
,,	27th	...	1435	,,	25 ,,	1	,,
,,	28th	...	1687	,,	19 ,,	7	,,

These captures were varied by an occasional Dog-fish, Edible Crab (one up to 4 lb.), Coal-fish, and a number of Grey Gurnards. One may imagine that numbers of Whitings must be swarming off the East Coast, when similar results characterized the various piers dotting the East Anglian seaboard. Even better results reward boatmen anchored some little way out to sea. On occasion the shoals are "spotty"; now and again they bite daintily, and are far from easily hooked, at other times they rush at any bait—lugworm and mussels, not refusing even half-putrid Herring. Sometimes they are on the feed all day, whilst at other times they absolutely refuse all bait until dusk has set in; while it is notorious that they bite as well, or even better than on the flood-tide. A long continuance of fine weather and placid tides is followed by a falling off in numbers, when a "stir-up" of wind and water would seem necessary to bring in fresh shoals. After a stiffish north-westerly wind Codlings appear, and come on to feed in exciting numbers:—

Oct.	7th	...	1895	Whitings	64 Dabs	7	Codlings
,,	8th	...	1079	,,	22 ,,	4	,,
,,	9th	...	1174	,,	20 ,,	2	,,
,,	10th	...	1205	,,	28 ,,	2	,,
,,	11th	...	2268	,,	16 ,,	4	,,
,,	12th	...	930	,,	45 ,,	2	,,

A few Whitings ran up to 2 lb. in weight, but the majority did not exceed ½ lb. One boat fishing with two rods took, respectively, during five days' angling, 64 lb., 64 lb., 36 lb., 73 lb., 77 lb. At Lowestoft two sea-anglers with their boatmen captured 475 fish in one day; and on the second their catch was weighed

at ten stone. In October end and in the beginning of November the numbers fell off considerably. Soles up to 1 lb. 11 oz. in weight had also been caught on the hook.

On September 25th Mr. F. C. Cook informs me an example of the Short Sunfish (*Orthagoriscus mola*) was exhibited in a Lowestoft fish-shop: it had been captured off Lowestoft by a steam trawler. He did not measure it, but suggested that from the tip of the pectoral to the tip of the anal fin it would measure 2 feet; judging by other examples of which I have records, the fish itself would be about 18 inches in length.

A Five-bearded Rockling (*Motella mustella*) was taken on a hook off Britannia Pier on October 14th. A by no means usual capture locally, although several are taken yearly in shrimp-nets.

My second Gattorugine (*Blennius gattorugine*) came to hand on October 26th, having been captured on a line by a young

BLENNIUS GATTORUGINE.

man fishing from one of the piers. This fish was a span long, and had turned to a dingy blackish-brown hue. My first example came to me from a shrimp-net on May 21st, 1899. The late Mr. T. Southwell recorded another taken on May 21st, 1900 (*vide* 'Victoria History of Norfolk,' p. 205). I am inclined to think that this last "record" arose from some confusion of dates in the notes supplied to the late Dr. Lowe, who was responsible for the account of the "Fishes."

There were a few goodly sized Roach taken in the Waveney near Beccles in late October. The 'Angler's News' records a catch of forty-seven Roach to one rod on a certain date, the largest of which weighed 1½ lb.; five others scaled a pound each. On the following day a fish was caught by the same rod that weighed 1 lb. 15¼ oz. seven hours after capture.

It is rarely that the Coal-fish (*Gadus virens*) visits local waters nowadays, but two or three small ones had been hooked from the piers late in October and early in November. One brought to me to identify on November 6th weighed about 2½ lb.

What undoubtedly would have been a record Herring fishing began this year under most inauspicious conditions, owing to the outbreak of war. Very early in the season the German mines flung broadcast with cold, calculating brutality did serious mischief among the boats, and restricted the fishing area, which became still more circumscribed when our own Admiralty was obliged to follow suit. Many of the boats with their crews were taken over by the authorities for mine-sweeping, so that numbers of the boats could not be fished. The Scotch boats putting in were exceedingly few; the Scotch fisher-girls came in very scanty numbers, as did fish-buyers, and all these left long before the normal ending of the season. Altogether some three hundred English boats and about seventy Scotch boats pursued the fishing. The loss to trade in many respects was enormous; "pickled" fish was forbidden exportation, owing to the possibilities of it being sent to Germany in a roundabout way. The lifelessness characterizing the whole fishing was depressing; quite half a hundred boats could not get crews.

Herrings this season were of good quality, and in general fetched good prices, in some instances realising record figures. The following examples of newspaper paragraphs (the 'Eastern Daily Press' issues one for Yarmouth and one for Lowestoft daily) may be taken as fairly typical reports, and should be interesting:—

"*Yarmouth, October* 22*nd*.—There was another busy day on the wharf yesterday, when something like one hundred and fifty boats arrived with from eighty crans [eight last] down, but the average was not quite so high as on Tuesday, and was estimated at thirty crans. Fresh Herrings sold steadily at 18*s*. 6*d*. to 15*s*.; and salted stuff, of which there was not much, made 15*s*. per cran. Another small party of Scotch girls arrived yesterday, and piles of filled barrels are now rising on the Denes, and in the curing yards."

"*Lowestoft, December* 4*th*.—The majority of the fifty boats arriving yesterday were only lightly fished whilst in many

instances the damage to nets was considerable. One boat landed forty-five crans of fresh, others only having a few crans, the price varying from 53*s.* to 60*s.* per cran. Overdays sold from 48*s.* to 50*s.*, the highest catch being twelve crans. Overnight a local boat belonging to Mr. J. Breach arrived with a nice catch of one hundred and fifty crans which averaged 40*s.* a cran—a remunerative night's work."

"*Yarmouth, December 4th.*—Some twenty boats arrived yesterday, some of which had sixty crans, but the others had very small takes, and the quality was not so good as it has been. Fresh Herrings sold at 61*s.* 6*d.* to 57*s.* 6*d.* per cran. The continued rough weather with other circumstances is leading to more boats making up, and the end of the voyage is not likely to be very far off. The catch for the week to last Saturday was 5060 crans, making the total for the season 175,960 crans, as compared with 808,496 crans last year. This season our export of pickled Herrings has been practically nil. Last year at this time we had exported 576,407 barrels and 177,232 half-barrels."

Nothing of especial interest broke the dull monotony of the daily round, save on the rare occasions when Herrings were very scarce, then somewhat extraordinary prices were made. Several boats had made up to the beginning of November from £700 to £1000 for the fishing. A fishing voyage realising £700 to £800 was esteemed a good one for a sailing drifter—a type now extinct; whereas the voyage of a steam drifter, with its consumption of coals and greater working expenses, needs to obtain £1300 to £1400 to be characterised as a good one.*

On November 6th Herrings were at famine prices. One lot of 'longshores (a small, compact, highly-prized Herring netted by small boats near the shore), numbering eighty-eight fishes, sold for 8*s.* 6*d.* to a Yarmouth buyer.

In November stormy weather prevented the fleet going out. On Friday (13th) but two boats had come in up to three o'clock in the afternoon, and a third came in later. The first had about three crans, which made 90*s.* per cran; the last comer, with a twenty cran "shot," made 97*s.* per cran to one buyer. Late on

* The "top" English steam drifter the 'Girl Marjorie,' almost the last boat to pursue the Herrings, made for her voyage some £2700; a Berwick boat coming second with £2500.

the Saturday the 'Girl Marjorie' brought in forty-one and a half crans of fresh, and some salted, Herrings. The former realised 127*s*. per cran; a record price, not only for Yarmouth but for any other Herring port. The salted fish made 50*s*. per cran. On the following Monday a thirty cran catch sold for the same large figure as on the Saturday. In some seasons when a glut has occurred I have known a last (ten crans) of Herrings fetch but £2; and as low a figure as £1 10*s*. for "overdays."

The fishing had come to a dead stop by December 12th, many of the boats having already "made up." I have been fortunate in securing, in round numbers, the figures of this year's unfortunate "Harvest of the Sea."

Total crans: 177,430 (or 17,743 lasts) as against 824,213 (or 82,421 lasts) last year.

Boats fishing: English, 361; Scotch, &c., 72 (as against a total of 999 last year).

From the 'Eastern Daily Press' I learn that of pickled Herrings (fish packed in brine) 49,000 barrels have been shipped, "the chief portion going coastwise. Only three cargoes went abroad to Stavanger, Bruges and France, and these went just before or about the beginning of the war." Number of barrels shipped last year—820,527 barrels by two hundred and forty-four steamers. The report adds the following serious note:—"With a decline of 646,783 crans in the catch, and a falling off of exports by 780,527 barrels, it is probable, taking into account all subsidiary elements—salt, coal, barrels, labour, losses on lodgings, port dues, and so forth—the monetary decline in one way and another compared with last year amounts to a million sterling, on quite a modest estimate." Add to this the failure of the summer lodging season—Yarmouth has indeed been hard hit by the war.

Of Cetaceans I have seen none whatever brought in, nor Sharks; and only on one occasion saw any number of Piked Dogs (*Acanthias vulgaris*) washed up at the tide-mark. Very few dead Herrings or Mackerel have at any time been cast up at the tide-mark, and the vast hordes of Gulls that collect in the vicinity of the harbour have been sadly put to for food; the poor creatures might have been seen sitting disconsolately on the shore or flying hungrily after each other in a mad scramble

for any coveted prize. The smaller Gulls that did not go inland or to some more tempting localities haunted the sewer outlets by the quaysides, glad to snatch at floating pieces of bread, or the skins and fragments of Herrings that drifted in the foul waters. The gutting yards were invaded, when the work-folk had gone to meals, for any pieces that might be found lying around. The nets spread on the south denes (sand-dunes) to dry were diligently examined by the hungry birds in their search for fragments and heads still entangled in the meshes. Later on the hungry birds became so emboldened as to resort to the fish wharf, on the roof of which they swarmed, to the entertainment of the wharf-folk, who threw on the slates broken Herrings and Whitings: for these the birds scrambled pugnaciously, but a fish once seized upon was seldom lost by the first to claim it. Salt Mackerel were as eagerly pounced upon, and as quickly devoured. A fish merchant complained to me of a catch of Herrings being badly mauled by Gannets as the fish hung in the nets before hauling. This is the first time I have ever had complaint made to me with regard to this species being troublesome; many Gannets visit the fishing ground, but hitherto have always been described to me as "fishing fair," *i.e.* naturally.

Mr. J. H. Gurney ('Irish Naturalist,' October, 1914) defends the Gannet against "alleged destructiveness" to the Herring. I myself have long been convinced that so great is the fecundity of the Herring that it is impossible for sea-birds—Gannets, Cormorants, and others—ever to reduce, let alone deplete, the shoals that annually throng our coasts: the great reduction in numbers of Cetaceans, large and small, in recent years must also be taken into account, as well as the present increasing capture of Dog-fishes for food. Nothing, I am convinced, can ever exhaust the Herring shoals, save the destructive trawl-net, which in a few hours is capable of destroying a hundred million times as many Herrings (*in the ova*—seeing that this sinks to the bottom) as all the sea-birds in Christendom devour, in the adult form, in a twelvemonth.

November 18*th*.—Observed a 2½ lb. Eel brought from sea, which was of an intensely dark blue-black colour all over, without the slightest suggestion of silveriness anywhere about it.

The earlier part of the fishing for Sprats off the Suffolk

coast was by no means encouraging: Mr. E. R. Cooper, of Southwold, writing me on November 19th, stated that "none were landed here worth talking about until last week, when about five hundred bushels were landed at the harbour, about one-fourth of the total catch." * The restrictions placed upon the fishing did not allow the usual freedom to fishermen: the Admiralty's order may be of more than ordinary interest as showing the dangers incidental in war time even to shallow water fisherfolk:—"Board [Board of Agriculture and Fisheries] are informed by Admiralty that Sprat fishing is permitted this winter on condition that boats do not go either to the westward or to the southward of the Mouse or use the Barrow Deep. Please inform the fishermen."

I never saw finer Sprats than have been exported for sale this winter, or with less "muck," *i. e.* weeds, crustaceans, *e. g. Idotea*, *Gammarus*, &c., nor had I fallen in with its peculiar parasite *Lerneonema sprattæ*.

On December 8th Mr. E. R. Cooper again wrote me as follows:—"Spratting is going on very well here; the total landings for Southwold in November were over four thousand bushels. On Sunday last (6th) one thousand six hundred and forty bushels were landed here; yesterday about one thousand five hundred bushels. To-day the boats were coming in well fished but too much wind to start again. [Sprats fish best on still foggy nights.] The bay is alive with Sprats, which we attribute to the southerly winds. The first fish train ran from the new harbour branch on Sunday with eleven tons of Sprats, and yesterday seventeen tons went from there . . . . a 21½ lb. Cod has been taken from the Pleasure Pier, which is a record for Southwold."

On December 9th all the fish shops had their quantum of Sprats on sale; in some cases owing to the dearth of trawl-fish they were the only fishes to be seen on the fish-slabs.

From a report sent to the 'Angler's News' of December 12th by Mr. S. W. Reynolds, forty-four tons of Sprats were sent to London on December 6th, and thirty-four tons on the following day.

* Many of the boats land their catches on the beach, hence the varying tonnages mentioned on December 6th and 7th.

Mr. F. C. Cook writes me on December 8th that "a Cod was exhibited in a fish shop window on November 4th that had been blown up by the explosion of a mine, and landed quite on the deck of a fishing boat; a piece of the mine was also shown with it." There can be no doubt that many fish have been killed by mines, but as these victims almost invariably sink, they at once offer food to other species and to the crustaceans that feed upon carrion. I recorded the washing up of a lean disreputable Cod which had undoubtedly been a victim to a submarine explosion: wreckage had at the time been blown up by the Trinity House authorities (*vide* 'Zoologist,' December, 1911).

Inspector Donnison in his most interesting half-yearly Reports on the Eastern Sea Fisheries called attention, in March, to the abundant catches of Smelts in the Witham, both by anglers and fisherfolk, which our Aldeburgh fishermen, who are always up in arms against the Terns, would do well to notice. These men should surely know the difference between the Smelt and the "whitebait" (juvenile Herrings). His remarks and statistics given of the Mussel and Cockle industries make very entertaining and profitable reading. The Yarmouth Mussel—that in my younger days, before the rivers and Breydon were so hopelessly poluted by sewage, gave employment at a dull season to quite a score of humble folk who dredged for the mollusc—is now entirely prohibited as food, and only an occasional fisherman takes it to sell as bait.

The Inspector complains of the presence of so many Dog-fish (*Acanthias vulgaris*), whose attacks on Mackerel caught in the nets often spoil one fish in five. He advocates a greater consumption of the "dog," giving as a proof of its increasing popularity the weight landed in England and Wales as 31,262 cwt. in 1911, and 55,539 cwt. in 1912, mostly taken off the south and south-east coasts. The species is, I find, commonly seen on Lowestoft fish market, but local prejudice is nearly as strong as ever in Yarmouth, where it is seldom put up for sale, and is then only covertly purchased by fish fryers. Mr. Donnison mentions an instance when, crossing from the Norfolk to the Lincolnshire coast he "watched the crew of a French trawler getting in their net, and it was so full of Dog-fish that it was only by instalments that the catch was boarded."

Other interesting items worth noting are as follow:—"According to the estimate given by the local Fishery Officers, 979,000 Crabs and 38,100 Lobsters were landed in the district this year to date" (Report for half-year to September 30th). Most of these were taken off Norfolk. Oysters—English and American—did well at Hunstanton. No less than 102,000 cwt. of Cockles were landed at King's Lynn for the twelve months ended August 31st last. He also writes: "Some of the Flemish Refugees, for whom homes have been found on the Norfolk coast, at once took to Mussels as a part of the food-supply to which they were accustomed in Belgium."

Only one jarring note finds a place in the Report, a wail from the Blakeney fishermen who, I think unjustly, accuse the increasing, well-protected Terns on Blakeney Point of seriously damaging the Smelt and Shrimp fishery. Unfortunately this class of men, like African witch doctors, *must* make some accusation against something, when natural causes, which they do not allow their intelligence to rightly fathom, make against their usual success. To the falling off among the Shrimps and Prawns I have already alluded.

On one or two occasions late in November a large shoal of Codlings up to 7 lb. and 9 lb. in weight afforded our few long-liners a little remunerative sport, while the numbers of Whitings had almost entirely vanished. I was interested in the frequent stunted Cods captured, and saw four on as many days, the head being disproportionately large for the size of the body, as shown in Yarrell's drawing ('British Fishes,' vol. i., p. 533).

The most curious Crab claw met with came to hand on April 3rd. In a small edible Crab I found the right pincer claw had been recently injured, a healing process having covered the fracture (no doubt, temporarily) with a shelly process: the left pincer claw never possessed but one chela—the upper free one—and even this was slightly distorted in shape, although it worked freely enough. The under fixed chela had never been present, so that the Crab had been quite incapable of nipping or tearing its prey, and I was not surprised at the starved and emaciated condition of the hapless crustacean.

A Bib (*Gadus luscus*) captured off the Suffolk coast early in December was found to have its tail damaged by the parasite

Lernea branchialis. It is nothing uncommon, even in healthy members of the genus *Gadus*, to find fat *Lernea* attached to the gill-rakers, but I think the position referred to in the unfortunate Bib is very unusual. This species is far more numerous off the Suffolk coast than off the Norfolk coast; but early in December some rather unusual catches were made by long-liners off the north-east corner of Norfolk. Few fishes deteriorate in appearance in so short a time as the Bib, and it rapidly decomposes after death. Small examples are hardly worth the trouble of cooking; and the bones are much too obtrusive even in larger ones. The inflated eyes do not add to its attractiveness. Couch suggests that this bladder-like inflation is due to the terror of the fish when taken, "by the agony of which the air of the swimming bladder is driven into these membranous parts." Small Bibs taken in the shrimp nets, when thrown over at sorting time, float on the surface of the river, and drifting upstream to the Breydon are eagerly picked up by the Gulls.

I am again under obligation to my friend, Mr. Robert Beazor, senr., a well-known local fish merchant, for the following notes:—"Very little worthy of record has come to my notice. With regard to Smelts, draw-netting from the beach began this year as early as January 8th, when about four score came to the fish wharf. From the placing of the different catches on the market from time to time, I can form no other conclusion than that the fishing was not nearly so remunerative to those engaged in it as in former years. The largest quantity on any one day was between fifty and sixty score. With regard to trawl fish I have little to report: catches were meagre and prices ruled high. The few 'Wolders' [small trawlers fishing the Wold] fishing made fair catches when able to go out, but frequent gales curtailed their efforts. What Soles (their principal catch) they caught made very high prices.

"The Mackerel and midsummer Herring voyages were practically failures. No great quantities were landed; I think the latter was due greatly to the capture of Herrings in the spring, when occasionally large quantities are taken, but are of little value as food and only fetch remunerative prices when wanted by long-liners for bait.

"I have had brought to my notice several times this autumn, Herrings (when cut for kippers) containing both the male and female organs (milt and roe), the sexuals varying in size. I have seen hermaphroditic Mackerel.

"Lately (December) I have seen numbers of Bibs sent from Cromer in boxes; fine fish, locally called 'Whiting-pouts.' They were large, of fine quality, very similar in eating to the Haddock, but with the Whiting flavour. As regards our autumn Herring fishery, this terrible war has sadly marred it. Hundreds of men who manned the boats were requisitioned by the Admiralty.

"Three or four Anchovies were brought to me at different times, having been captured with the Herrings."

It may be interesting to add that towards the close of the year trawl-fish had, in this neighbourhood, lessened practically to vanishing point, and but for the remarkably good Sprat season the majority of our fish shops might have closed their doors, unless smoke-dried fish (*e.g.* "Bloaters" and "red" Herrings) formed a part of the stocks: several small shops had on sale nothing else but Sprats, a heap of fresh ones in the centre, with "Bloater," Sprats, and "red" Sprats on "spits" (sticks) making a tempting display around it.

With regard to Mr. Beazor's remarks on the Smelt; I believe that, generally speaking, Breydon and the adjacent rivers were well fished, but several of the smelters send their catches in small boxes direct to Billingsgate Market. But prices have ruled rather low.

NOTES ON ANEMONES FROM THE MILLPORT MARINE BIOLOGICAL STATION.

By Richard Elmhirst, F.L.S.

It is well known that "increase by spontaneous fission" is an occasional means of reproduction in Anemones (*vide* Gosse, 'History of British Sea-Anemones,' 1860, p. xxi.). In a paper, "Regeneration and Non-sexual Reproduction in *Sagartia davisi*" (Univ. of California Publications; Zoology, vol. i., 1904), H. B. Torrey and J. R. Mery describe the details of fission, and give a useful bibliography of the subject. From many recorded cases it appears that dividing individuals usually complete their division in a few days or weeks; this is especially the case in *Anthea*. On the other hand, however, I have seen cases of "double" Actinolobas, which showed no change during a period of several months; it may be, of course, that when "double" specimens are brought into captivity some change in their environment may arrest the normal course of their division.

Actinia.

In 1911 I found an *A. equina* with two complete discs, mouths, and sets of tentacles. After nearly four years in captivity there is no change in the form of this individual. In January, 1913, I found a second *A. equina*, with two almost complete discs, &c., apparently in course of division. This specimen was isolated in captivity. In March and April it produced a few normal young; by May all trace of division had disappeared, and the specimen was apparently normal; for a few days an indentation across the base suggested that aboral-oral fission was about to take place. This did not happen, and the specimen is now (December, 1914) apparently normal. Normal young were extruded in the spring of 1914.

Five years ago I put a normal *A. equina* into a well-lit glass-

sided aquarium. It soon settled down, and in a few weeks both its colour and habits changed. It has grown considerably, and practically never closes but sits attached to the side of the tank or a stone, with the tentacles all hanging limply down and not spread in an erect manner, as is usual in *A. equina*. Each year it has produced a few young, all of the acquired olivaceous colour. They, too, have grown very large; I lately measured the base of one attached to the glass, and found it was 6·4 × 4 cm. across. Their acquired colour, which suits the surroundings, is rather darker than that of *Ascophyllum nodosum* on the column, whilst the disc, tentacles, and young are about the shade of the yellowish green tips of *A. nodosum*. The edge of the disc and the "beads" are still of a pale blue colour. In August a young specimen, six months old, 1·4 × 2 cm. across the base, began to divide, and completed its division in about three months.

Urticina.

In February, 1913, I found a single specimen of *U. felina* in a most unusual situation. It was living in the middle of a sandy bay, with just the top of the column protruding; its base was swollen so as to anchor it firmly in the sand. There were no stones to which it could attach itself in the usual way.

Stomphia.

In July, 1910, in a tank containing several specimens of *Stomphia churchiæ*, there were two specimens which had lived within a few inches to a foot of each other for about a year. When expanded, the smaller one was about 3 inches across the tentacles, and the larger about 6 inches. At 7.50 p.m. on July 4th I observed the smaller one sitting right in the mouth of the larger, both specimens being fully expanded. There was no sign of any struggle, as though the larger were trying to eat the smaller. The inner tentacles of the larger were adjacent to the outer tentacles of the smaller, were waved about, and from time to time touched those of the smaller. At 9.30 p.m. the smaller specimen, still expanded, began to emerge from the mouth of the larger, which curled back its tentacles on one side and protruded its gullet, and so helped the smaller to get away. When the

smaller was got rid of, the larger one closed quickly and completely, then promptly opened again. During the following days they were both again in their usual situations. Some time previously I had interrupted this process and freed the smaller from the larger, under the impression that the one was eating the other. The behaviour described above is peculiar, and I do not pretend to understand or explain the significance of it.

Peachia.

In "The Structure and Habits of *Peachia hastata* (Gosse)" (Proc. Royal Dublin Soc., N. S., vol. iv., 1885), A. C. Haddon and G. Y. Dixon give a good account from Holdsworth (Ann. N. H., 1859) of the way in which *P. hastata* buries itself. Observations made in 1914 entirely corroborate the account there given. With regard to feeding habits, they say: "This Anemone *can swallow* * a good-sized piece of food if it is placed on its disc," such food is taken quickly, "and often without the aid of the tentacles at all. . . . The tentacles . . . do not seem to be provided with urticating powers to the same extent as the tentacles of other Anemones; for Shrimps and little fish that haunt flat sands brush against and even rest upon them, without suffering any apparent inconvenience." These remarks and a number of experiments and observations which I have made show that *Peachia* does not prey on other animals as the ordinary Anemones do. I supplied my Peachias with *Gammarus*, Plankton, and young fish a few days old, and found that the *Peachia* made no attempts to capture them. So I concluded that *Peachia* has some other way of procuring food. I then put powdered carmine into the water, and found that there was a steady ciliary incurrent stream through the conchula. After the carmine had been going in for a few minutes a carmine-laden mucus thread began to be extruded from the opposite (asulcar) side of the mouth. Diatoms were seen to be taken in in the same way as the carmine. Haddon and Dixon also say: "*Peachia hastata* . . . may often be seen with its tentacles withdrawn while the conchula is still protruded level with the top of its hole. . . . Sometimes when it projects perpendicularly out of the hole it

* The italics are mine.—R. E.

encircles itself with a collar about one inch in depth of slime set thickly with particles of sand."

Now, when in either of these positions, the *Peachia* can still feed by the ciliary incurrent stream, which can also serve for respiration. There is no ciliary current noticeable on the column, and only a very faint incurrent between the tentacles. It is interesting to note how similar is this ciliary mode of feeding to that of Cockles and other sand-dwelling animals. The part of the Southannan sands where we usually get *Peachia* is a place where Diatoms and small algæ are often so abundant as to discolour the surface of the sand when the tide is out. The incurrent ceases when the *Peachia* is closed, and ceases for a while when partly closed after an alarm.

ON THE LOCATION OF THE SACCULUS AND ITS CONTAINED OTOLITHS IN FISHES.

By Colonel C. E. Shepherd (Indian Army).

In continuation of the article under the above heading that terminated in vol. xviii. (1914) p. 146, of the 'Zoologist,' fresh material has come to hand of interesting but not generally accessible fishes. The information gathered is now published to bring all the available knowledge on the subject up to date. Additional illustrations of otoliths, alluded to in the former paper, are also given.

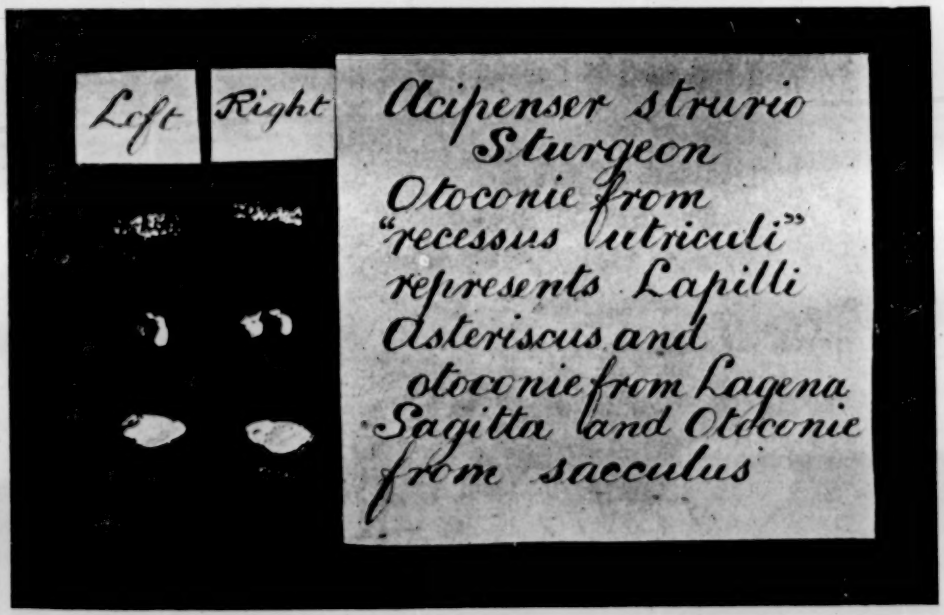

Fig. VII.

Acipenseridæ.

Acipenser strurio (the Sturgeon). Illustrated fig. VII. The otoconie in place of a solid lapillus, and in conjunction with the other stones seems to be a connecting-link, in the case of otoliths, between the cartilaginous and teleostean fishes.

ELOPIDÆ.

Elops saurus. The otoliths are illustrated (fig. IV., 9).

OSTEOGLOSSIDÆ.

Arapaima gigas, called the "Pirarucu" at Manáos, on the Amazon River, Brazil. To this species belongs the largest of freshwater fishes; it has a corresponding otolith (fig. V., 10). This is enclosed in a bony pocket that has to be cut open to obtain the otolith; there is no external indication showing site of sacculus. The specimen illustrated was got from a 5 ft. 9 in. fish caught in the interior of British Guiana. The rings of growth of the stone are to be seen in the upper one. The hump in the central part of the stone is a peculiarity special to this fish.

Osteoglossum bicirrhosum. The otoliths shown (fig. IV., 10).

CHIROCENTRIDÆ.

Chirocentrus dorab. Illustrated fig. V., 3.

OSTARIOPHYSI.

GYMNOTIDÆ.

Eigenmannia virescens. Illustrated fig. IV., 5.

SILURIDÆ.

Bagarius yarrellii (a freshwater Siluroid). This specimen came from one of the rivers in Bengal, India. It was over six feet in length; the otoliths are conspicuously small. There was no external indication either for the site of the sacculus or for the position of the lapilli. The swim-bladder which, in the Ostariophysi, is connected with the ear-labyrinth, is, in this fish in two separate small bladders. The Weberian ossicles which form the connecting-links were of good size, especially the "tripus." The contrast in size between the otoliths (fig. VI., 6) of *B. yarrellii*, and those of a salt-water Siluroid (*Ælurichthys gronovii*, fig. VI., 7) and of a *Gadus merlangus* (fig. VI., 8) is instructive.

Ælurichthys gronovii, one of the so-called "Catfishes," got at Demerara, British Guiana. This is allied to the Arius family, and the specimen obtained was a moderate-sized fish, probably some eighteen inches in length, judging by the head, which was the only portion sent. The site of the lapilli, the biggest of the otoliths, was shown externally by two big swellings of thin, shiny

bone, and that of the sacculi was indicated by two slight swellings. The lapilli were picked out of their respective cavities without any cutting away of bone, but to get the sacculi and their contents the bone had to be carefully cut away.

Piratinga sp.?, a river Siluroid from British Guiana, where it is called the "Lau Lau." It grows to a great size, even up to seven feet. The site of the lapilli was shown by two bulges in the bone of the skull; the site of the sacculi was likewise indicated

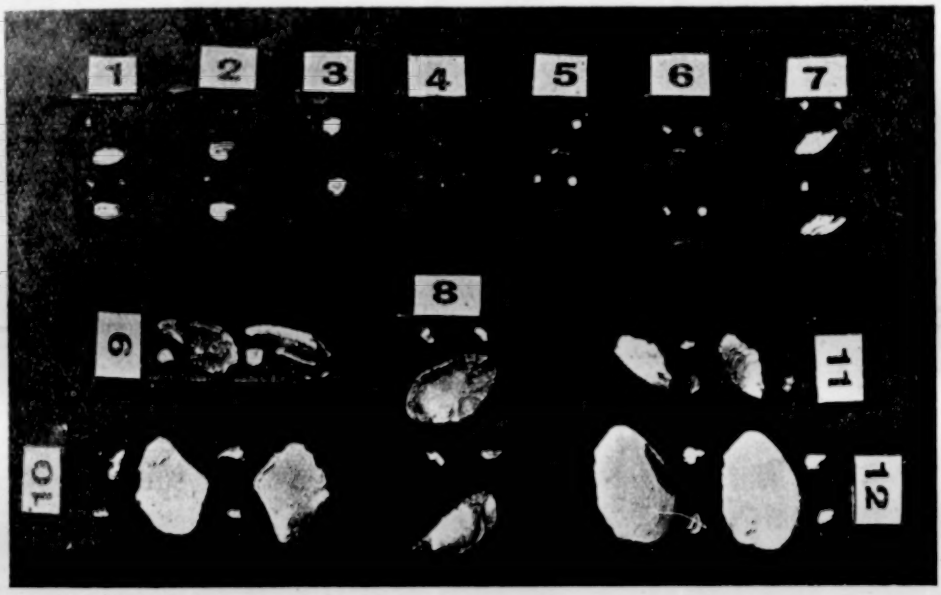

FIG. IV.

1. KUHLIA MARGINATA. 2. TREMATOMUS HANSONII. 3. BREGMACEROS MACCLELLANDII. 4. AMPHISILE SCUTATA. 5. EIGENMANNIA VIRESCENS. 6. ASPREDO SICUEPHORUS. 7. NANDUS MARMORATUS. 8. LUTJANUS ANNULARIS. 9. ELOPS SAURUS. 10. OSTEOGLOSSUM BICIRRHOSUM. 11. ATHERINICHTHYS ARGENTINENSE. 12. MURÆNESOX TALABON.

externally by slight prominences. The otoliths themselves were small for the size of the fish.

Doras maculatus, a freshwater Siluroid, called the "Bombom" at Demerara. There were no external indications of sites of otoliths. The lapilli are very small for the size of the fish. Neither of the sagittæ were found.

ASPREDINIDÆ.

Aspredo sicuephorus. Illustrated fig. IV., 6.

SYMBRANCHIDÆ.

AMPHIPNOIDÆ.

Amphipnous cuchia, an Indian fish that has accessory breathing apparatus enabling it to live out of water, buried in mud, or to live comfortably out of the water in the weeds on the banks of a river or pool. The site of the sacculi is indicated by a shiny flat surface on the bone of the occiput. The sacculi do not lie exactly under the skull but rather to the outer sides. There is a distinct lagena. The sagittæ, though embedded in bone at the sides and ends, could be lifted out through the orifices above them.

APODES.

Muræsox talabon, called "Koolarie" by the Tamil fishermen of Madras. The sacculi of this fish are pointed out in their position by two large excrescences of the basi-occiput. The sacculus is much embedded in bone, the sagitta fills the pocket it is contained in fairly tightly. The lagena is small but distinct, attached to the extremity of the sacculus. The sagitta is large and flat. Fig. IV., 12.

PERCOPSIDÆ.

Percopsis guttatus, a freshwater fish found in North America. The sites of the sacculi are shown by two large oval bulbs on the basi-occiput of very thin bone. The sagittæ are large for the size of the fish. Fig. VI., 5. The specimen obtained was but three and a half inches long. No trace of asterisci could be found.

FISTULARIIDÆ.

Fistularia serrata, a fish from India. There are two elongated swellings of thin bone on the basi-occiput, not immediately underneath but rather to each outer side that point out the position of the sacculi. The sagitta is small.

AMPHISILIDÆ.

Amphisile scutata. Illustrated fig. IV., 4. There is a slight notch in the sagitta that is only visible if magnified.

ATHERINIDÆ.

Atherinichthys argentinense. Illustrated fig. IV., 11.

MUGILIDÆ.

Mugil braziliensis. Illustrated fig. V., 6.

OPHIOCEPHALIDÆ.

Ophiocephalus marulius, the "Mŭrrŭl" of India, an esteemed freshwater table fish. This fish has an accessory breathing apparatus, enabling it to use atmospheric air in respiration. It often passes a considerable time under the mud of dried-up tanks. The sites of the sacculi are shown by two prominent bony excrescences of the basi-occiput that project into the cavity occupied by the accessory breathing apparatus: the bone of the excrescences is not transparent. The sacculi are in pockets with

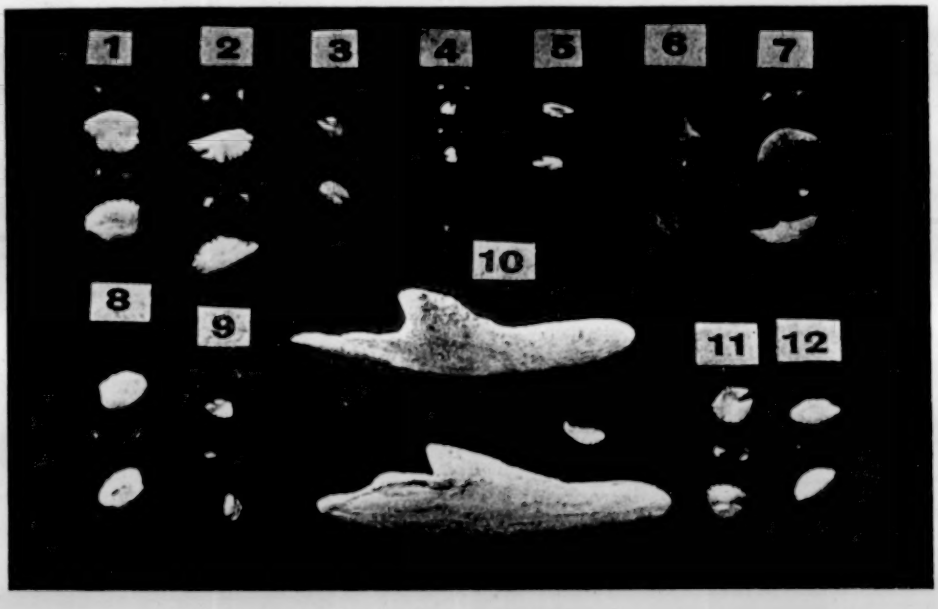

FIG. V.

1. PSETTA LÆVIS. 2. PERCA FLUVIATILIS. 3. CHIROCENTRUS DORAB.
4. CAPROS APER. 5. CLUPEA HARENGUS. 6. MUGIL BRAZILIENSIS.
7. SILLAGO SIHAMA. 8. HIPPOGLOSSOIDES LIMANDOIDES.
9. MULLUS BARBATUS. 10. ARAPAIMA GIGAS. 11. TRIGLA GURNARDUS.
12. URANOSCOPUS SCABER.

open tops through which the sagittæ could be got out. The lagena, a broad prolongation of the sacculus, is embedded in bone and has a pocket of its own that required careful cutting open to obtain the asteriscus. The right lapillus could not be found in this fish, although both were got out of another specimen. The "sulcus acousticus" is well-defined (fig. VI., 1.)

MACRURIDÆ.

Macrurus investigatoris, a deep-sea fish from the Indian Ocean at a depth of 446 fathoms (2676 ft.). A prominent bulbous swelling of thin bone under the skull, and sufficiently transparent, allows the sagittæ to be seen "in situ." The sagittæ could be picked out of their pocket through the opening at the top of it; they are large for the size of the fish (fig. VI., 3).

Macrurus armatus has a similar bulbous excrescence to that above described that contain the sacculi.

Bathygadus furvescens, a deep-sea fish from the Indian Ocean at 555 fathoms (3330 ft.). A bulb of transparent bone under the basi-occiput allows the sagittæ to be seen; they are fairly large for the size of the fish (fig. VI., 4). They fill the cavity in which they rest, giving no room for motion, and were got out easily without much cutting away of bone. A distinct lagena with a special pocket for it.

GADIDÆ.

Bregmaceros macclellandii, from the Bay of Bengal, Indian Ocean. Günther says of it, "a dwarf Gadoid, the only one found at the surface between the Tropics." As in other Gadoids the sagittæ are large for the size of the fish (fig. IV., 3). The specimen obtained was only two and a half inches in length.

Gadus merlangus (the Whiting). Illustrated fig. VI., 8.

BERYCIDÆ.

Hoplostethus mediterraneus, a deep-sea fish from the Indian Ocean, got at 330 fathoms (1980 ft.). A large transparent bulbous swelling under the basi-occiput allows the sagittæ to be clearly seen. When the head was inverted and rocked from side to side the sagittæ, the right-side one especially, could be seen moving in the sacculus and falling from side to side, showing the roominess of the cavity containing them. The sagitta is large and of uncommon shape, with its two little projecting spikes (fig. VI., 2). The "sulcus acousticus" runs in a boldly curved line along the length of the stone and curves upwards at the forward end. The sacculus has a distinct lagena to it.

CENTRARCHIDÆ.

Kuhlia marginata. Illustrated fig. IV., 1.

TOXOTIDÆ.

Toxotes jaculator, an Indian fish, with the curious habit of shooting its prey of flies, as they sit on leaves of plants overhanging water, with a pellet formed of a drop of water. They are kept in aquaria by the natives of Bengal to watch the process. A swelling of thin bone, but not of great size, denotes the site of the sacculi. The sagittæ were lifted out easily without any cutting away of bone. They are large for the size of the fish (fig. VI., 11).

NANDIDÆ.

Nandus marmoratus, an Indian fish. The specimen examined came from the delta of the Ganges. Two very prominent bony excrescences on the right and left of the basi-occiput indicate the sites of the sacculi; the bone is hard and not transparent. The lagena is a distinct broad prolongation of the sacculus. The sagittæ are moderately large; the pocket that contains them, although open at the top, requires the bone to be cut away before they could be abstracted (fig. IV., 7).

PERCIDÆ.

Perca fluviatilis ("the Perch"). Illustrated fig. V., 2.

SERRANIDÆ.

Lutjanus annularis, a fish from the Indian Ocean. A piece of thin bone but not transparent projecting slightly from the basi-occiput points out the site of the sacculus. The sagittæ are very much curved (fig. IV., 8), and are fairly large, also much embedded in bone that requires to be cut away to get them out. The lagena is a broad prolongation of the sacculus, but not marked off by any appreciable constriction.

SILLAGINIDÆ.

Sillago sihama, called "the Whiting" by English people at Madras because it is a good table fish, reminding them of Whiting. The sites of the sacculi very plainly marked by two prominent swellings on the basi-occiput of thin bone, transparent enough to show the sagittæ in their natural position, which is very much inclined to the centre line of the skull. The sagittæ are much curved (fig. V., 7), and the bone at the two ends requires to be cut away to get them out. The lagena is a

distinct prolongation but not marked by any constriction of the sacculus. The "sulcus acousticus" not very well defined.

SPARIDÆ.

Chrysophrys berda, from the Indian Ocean. A piece of thin bone on the basi-occiput, but not standing out from it, shows the site of the sacculi; neither is the bone thin enough to be transparent. The sagitta is much curved, also much embedded in bone. A distinct lagena marked, by a constriction, from the forward part of the sacculus.

MULLIDÆ.

Mullus barbatus (the "Red Mullet"). Illustrated fig. V., 9.

CAPROIDÆ.

Capros aper (the "Boar Fish"). Illustrated fig. V., 4.

OSPHROMENIDÆ.

Osphromenus hepturus, a fish from Java. The same remarks apply as in the case of *O. olfax* described in the 'Zoologist,' April, 1914, p. 139.

CICHLIDÆ.

Tilapia hendcloti, from the Mabole river, Sierra Leone district, West Africa. The location of the sacculi shown by two prominent excrescences, one on each side of the basi-occiput. The pocket enclosing the sacculus is open at the top but required cutting away at the two ends. The lagena end especially required releasing. The lagena shows as a distinct prolongation marked by a slight constriction where it takes off from the sacculus.

Hemichromis bimaculatus. This specimen came from the Mabole river; it is also found in the Nile. The sites of the sacculi shown by two prominences of thin bone, one on each side of the basi-occiput. The sagittæ are large for the size of the fish.

PLEURONECTIDÆ.

Psetta lævis (the Brill). Illustrated fig. V., 1.

Hippoglossoides limandoides (the Long Rough Dab). The position of the sacculi shown by two small bulbs on the basi-occiput, the sagittæ are rather inclined to be large for the size of the fish; they show the rings of half-yearly growth very distinctly when they are first got out of the head (fig. V., 8).

KURTIDÆ.

Kurtus indicus, a small fish from the Indian Ocean. The specimen obtained was got on the Orissa coast, Bay of Bengal. Two prominences, but coalesced so as to appear like one large bulbous swelling of thin bone under the basi-occiput, show the sites of the sacculi most apparently. A distinct lagena. The otoliths are all large for the size of the fish (fig. VI., 9).

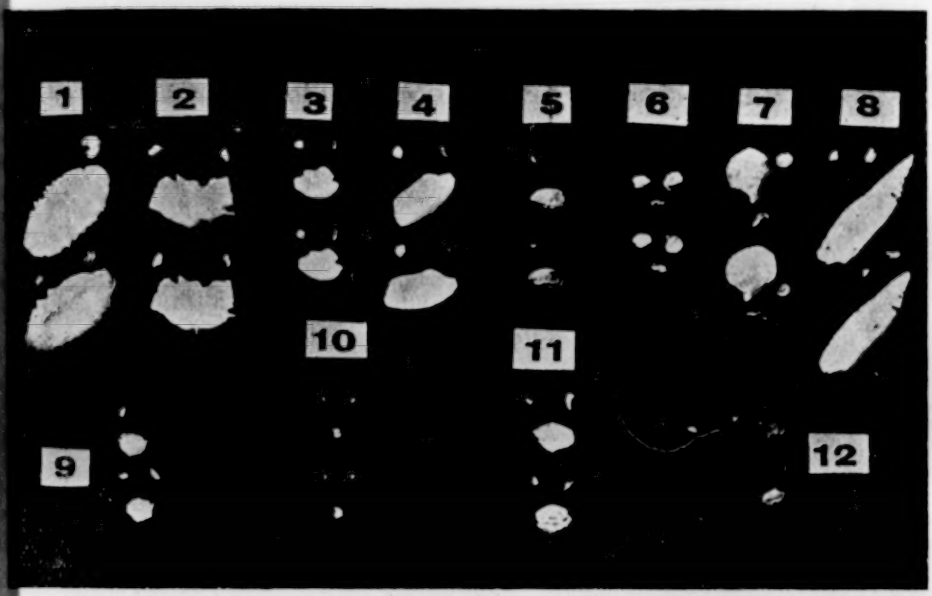

FIG. VI.

1. OPHIOCEPHALUS MARULIUS. 2. HOPLOSTETHUS MEDITERRANEUS. 3. MACRURUS INVESTIGATORIS. 4. BATHYGADUS FURVESCENS. 5. PERCOPSIS GUTTATUS. 6. BAGARIUS YARRELLII. 7. ÆLURICHTHYS GRONOVII. 8. GADUS MERLANGUS. 9. KURTUS INDICUS. 10. OSTRACION GIBBOSUS. 11. TOXOTES JACULATOR. 12. AMPHIPNOUS CUCHIA.

TRIGLIDÆ.

Trigla gurnardus. Illustrated fig. V., 11. The deep notch in the sagittæ of the family shows distinctly.

NOTOTHENIIDÆ.

Trematomus hansonii. Illustrated fig. IV., 2.

URANOSCOPIDÆ.

Uranoscopus scaber. Illustrated fig. V., 12.

OSTRACIONTIDÆ.

Ostracion gibbosus. The fishes of this family are all called "coffer" or "trunk" fishes, owing to the rigid box-like case they are enclosed in. The specimen examined came from India. There is no external evidence to show the sites of the sacculi. The ear-labyrinth each side is contained and reposes in two cavities inside the skull, whence it was picked out by forceps without any cutting. The sagitta and asteriscus in one, and the lapillus inside the "recessus utriculi" in the other cavity (fig. VI., 10).

Ostracion nasus. The observations made for this specimen are similar to those for the previous one.

NOTES AND QUERIES.

AVES.

Birds Travelling North in Autumn.—Referring to Mr. Gurney's notes on this subject (Zool., 1914, p. 449), I might state that on October 2nd I witnessed a northward movement of Mistle-Thrushes in fair numbers; a few flocks of Linnets were also going in the same direction. I was away from the coast for several days after October 2nd, consequently I have no notes for the 7th, when Mr. Gurney observed the northward movement. It has been my practice for several years to watch the seasonal migrations at Lowestoft, and I have often been puzzled at the cross-movements, both in spring and autumn, more especially during the earlier part of the seasons. It is quite usual to see Linnets, Pipits, Tree-Sparrows, &c., going south in early spring, and the same going north in autumn. I have occasionally seen Rooks, Jackdaws, and Hooded Crows arrive from over the sea in autumn, and fly north on reaching land, and have wondered whether the movements of Finches may have been of a similar character, the birds having arrived on our shores further south.—F. C. Cook (Lowestoft).

Nesting of Troglodytes parvulus.—Referring to Mr. E. P. Butterfield's note ('Zoologist,' 1914, p. 432) on the nesting of the Wren (*Troglodytes parvulus*), he may be interested to know that I recorded several similar instances in the 'Zoologist,' 1910, p. 158. In June, 1913, another case occurred in my garden, where a Wren built a nest inside a box roughly formed of cork bark, intended for Tits, placed against the bole of a tree. Here, again, very little nesting material was visible outside except round the orifice, which was reduced in size. The top of the box in this case was lined with moss inside, as elsewhere, forming a dome but of course not showing outside. This summer a pair built a nest of the normal type, worked into the side of a Thrushes' nest, somewhat high up in an apple-tree, and both were occupied at the same time.—S. G. Cummings (9, King Street, Chester).

Pied Blackbird at Yarmouth.—On December 5th a very beautiful Pied Blackbird was shot at Upton, near Acle, a few miles from here. The bird had been observed for some months in the neighbourhood, but up till then had successfully evaded its pursuers. It was fully adult, and, I believe, a male bird; its "markings" on either wing were as evenly distributed as those of a Snow-Bunting; the tail, however, was not so evenly blotched with white. A feather or two on the right side were mostly white, three others being tipped only, whilst the left tail-feathers were black. I was fortunate in obtaining the bird for my blind friend Dye's small but choice collection of locally obtained birds. — A. H. Patterson (Ibis House, Great Yarmouth).

Display of female Eunetta falcata.—On that particularly miserable wet morning (in London, at any rate), January 3rd, I found several species of Ducks vigorously displaying at the Zoological Gardens, including the fine Falcated or Bronze-capped Duck (*Eunetta falcata*), of Eastern Asia, which has only been imported freely during the last year or two. The display of the males was essentially similar to that of the most typical ducks—Mallard, Pintail, Gadwall, Teal, &c.—though the erection of the full long crest made the head look enormous in size. There was the same rear-up with head bent down, followed by an up-jerk of the hind parts; the long sickle-shaped tertials, so noticeable in this species, seemed little if at all expanded, and were not so prominent in the display as one would have expected from their abnormal character. But what especially attracted my attention, as I had noted the display of the male of this Duck some time before, was that the females displayed simultaneously with the males, and with the same gestures. This is commonly seen with the Muscovy Duck (*Cairina moschata*), but I have never noted it in the case of female Mallard, Teal, or any other species of the typical group to which *falcata* undoubtedly belongs, its nearest ally being perhaps the Gadwall. Female Mallard have their own ways of communicating their emotions, but not, so far as I know, by gestures resembling those of the drakes.—F. Finn.

Bark-peeling Habit of Sparrow.—At the back of my lodgings there are several small lime-trees, the branches and twigs of which are much attacked in places by the local Sparrows, which peck away the outer bark and drag off bits of the inner fibrous layer, no doubt to line their nests, as they carry it off by the beak-full; one may see branches thus stripped for at least a yard of their length, and they were doing this even last month.—F. Finn.

NOTICES OF NEW BOOKS.

Text-book of Embryology. Vol. i. Invertebrata. By E. W. MacBride, M.A., D.Sc., F.R.S. Edited by Walter Heape, M.A., F.R.S. London: Macmillan & Co. 1914.

This monumental work, of course, specially appeals to the expert laboratory zoologist, the subject demanding for the most part special training and acquaintance with the technique of section-making, &c. This technique is fully dealt with in the course of the work, and directions are also given for the rearing of various free-swimming embryos, which in some cases has been remarkably successful; a suitable food for some of these minute marine organisms has, it seems, been discovered in the diatom *Nitschia*, which has been successfully submitted to artificial cultivation.

Naturally most of the work is not of a character to appeal in this way to the bionomical as well as the morphological zoologist; but it is worth noting that Professor MacBride's style is admirably lucid and avoids technicality even in a highly technical subject. He speaks, for instance, of certain ova as "yolky," where the average morphologist would have yielded to the temptation of saying "polylecithal." In matters where difference of opinion exists he always puts his arguments temperately; and in fact the book is a model of exposition.

Certain types in each natural group are selected for description in development, preference being given to those which are accessible to students in temperate regions, and to those which have been most recently worked out. The *Echinodermata*, on which so much important embryological work has been done, naturally bulk largely in the work, and some of the results of the experimental embryology practised on the ova of the animals of this phylum are of extraordinary interest. Hybrids, for instance, have been produced freely between the sea-urchins *Echinus esculentus* and *E. miliaris*, and the hybrids thus obtained,

which have been reared through their metamorphosis, vary remarkably in their inheritance of parental characters, even from year to year. But far more remarkable than this is the fact that different orders of Echinoidea can be crossed, whereas in Vertebrates and Insects even separate families cannot be thus treated. Professor MacBride has himself bred larvæ from *Echinus esculentus* and *Echinocardium cordatum*, though they could not be kept alive longer than eight days. Most wonderful of all is the fact that echinoderm eggs can be fertilized by mollusc sperm and yield larvæ.

It is found, moreover, that echinoderm eggs can be fertilized by simply being treated with hypertonic sea-water, *i.e.* water in which the normal proportion of chlorides is increased; but the segmentation in such cases is occasional and irregular, and the larvæ feeble, lying on the bottom.

Professor MacBride has much of interest to say on the subject of larvæ more familiar to the ordinary naturalists. He considers that the worm or grub type of larvæ is really an ancestral form, modified by the necessities of its environment, and points out that the active larva of the Cockroach is not really ancestral, but passes through a stage in the egg in which it shows rudiments of abdominal limbs, recalling a worm-shaped ancestor like a centipede. Abdominal limbs also occur in *Machilis*, one of the most primitive insect order *Thysanura* (the Spring-tails). He points out that the most helpless and worm-like larvæ, those of the more specialized Diptera, are practically in the position of parasites, and have lost their limbs and even their jaws in consequence. The parallel might have been carried farther; for larvæ of the caterpillar and maggot type exhibit the peculiarity, noticeable in parasites, of being able to live entirely on one kind of food, and preferentially doing so, while many fly-maggots are actually parasitic in various ways, from merely sucking the blood of the host to actually living inside it. Altogether this book is one to be most warmly recommended to all naturalists.

EDITORIAL NOTES.

Miss R. S. Twyman writes from Leominster: "I am very sorry to have to tell you that my Swift [see 'Zoologist,' 1914, p. 152] died about two months after you were here. [This was on a lecturing engagement terminating in March, 1914.] It continued to thrive and to take its food right up to the end. It died in a fit, brought on, I am afraid, as the result of fright. A few minutes before it was clinging in its usual place, on the front of my dress, under my chin. My sister, who is Secretary of the Women's Adult School here, brought in two of the members who had expressed a wish to see the Swift; they were strangers, and the bird had of course not heard their voices before. I noticed it was more than usually nervous, but being anxious to encourage the interest taken in the bird, I continued to show them all its habits, and placed it in its basket, that they might see how it spent the night, when it almost immediately had the fit. I think it would not have happened if I had kept it on my hand or my dress. It was a great disappointment to lose it. The plumage was much healthier after the moult.

"I have generally been successful in rearing young birds. About nine years ago I found a whole nest of Sparrows on the ground; they had been dragged from the nest by the parent bird, by one of those untidy ends which Sparrows are so fond of leaving hanging from their nests. This nest was in the point of a gable in a house three stories high. They all lived, and when fully fledged I found homes for them. I gave one to my sister, which is still alive, and a most interesting companion. It has always been allowed to fly about the room for a part of every day; the door or window can be left open—it will not attempt to fly away. One of its legs was injured in the fall, but it has lived its life very cheerfully, hopping about on one leg. Another one was injured on the side of its head, and no feathers developed on that part. It is wonderful what a Sparrow will survive.

"I have also reared Starlings which have fallen from the nest at a few days old—one lived for five years. I found them the most companionable birds I have kept. I clipped one wing and they were let out in the garden for the greater part of the day; they would

come to me when I called to them, and if I sat out in the garden would spend the time either on my chair or near my feet on the ground—when I came in they would retire to a hedge or into a tree."

The docility of the Starling in captivity is well known, though it is very rarely kept as a pet now-a-days; but Miss Twyman's success in keeping a picked-up Swift nestling for nearly a year, and moulting it successfully, is a most remarkable avicultural achievement. Her notes on the pet Sparrow are also of particular interest, because it has been suggested that Lesbia's Sparrow, honoured with a funeral notice by no less a person than the poet Catullus, could not have been a Sparrow, because Sparrows make such unpleasant cage birds.

It is true that the Roman Sparrow must have been *Passer italiæ*, which replaces *domesticus* in Italy, and may well differ in disposition from it; the large and beautiful Russian and Siberian Goldfinches, though not now separated as a species from our Goldfinch, are well known to be much quieter in captivity, and are commonly exhibited soon after importation. But, in addition to this record of Miss Twyman's, there are two other recent ones of common House-Sparrows kept as pets by English ladies, and proving most interesting birds—one given by Mr. W. H. Hudson in his 'Birds of London,' and one published in that very interesting collection, Dr. W. T. Greene's 'Notes on Cage Birds.' Thus there is no reason to doubt that the Roman lady's pet was a true *Passer*. With regard to the bird cited by Mr. Hudson, it is of interest to note that it lived to the age of eighteen years, dying at last suddenly and in good condition.

'The Vertebrate Fauna of North Wales.'—Mr. H. E. Forrest writes: "I am preparing a Supplement to the above volume, and shall be glad to receive any additional notes or observations from naturalists who can help in that way. Address: H. E. Forrest, Bayston Hill, Shrewsbury." No doubt many readers of the 'Zoologist' will be able to give the required assistance, but we might perhaps be allowed to suggest that such notes might well be sent to this magazine; there has been a regrettable shortage in the "Notes and Queries" of late, while the publication of the notes would be of service to compilers of books, inasmuch as one observation, published, is likely to draw a record of another.

Errata. — Vol. xviii., December, p. 452, *Asplachna* should be *Asplanchna*.